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Imagery analysis report

Large-Diameter Casting Pits at Soviet Solid Propellant Rocket Motor Production Facilities (TSR)

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LARGE-DIAMETER CASTING PITS AT SOVIET SOLID PROPELLANT ROCKET MOTOR PRODUCTION FACILITIES (TSR)

ABSTRACT

1 (TSR) A major modernization program involving the construction of large-diameter, subsurface casting pits has been identified at three Soviet solid propellant production plants. Two pits have been constructed at Biysk Solid Motor Production Plant II and one is under construction at both Kamensk-Shakhtinskiy Solid Motor Production Plant and at Pavlograd Solid Motor Production Plant. Rocket motors and rocket motor containers of [redacted] or more in diameter have previously been seen at these production plants. The construction of large subsurface casting pits at these three facilities indicates that the Soviets are developing the capacity to produce even larger diameter rocket motors. These motors could be used for new, large ICBMs and/or boosters for space launch vehicles. 25X1

2. (TSR) This report discusses the large subsurface casting pits identified at the three propellant production facilities and contains seven photographs and two tables.

INTRODUCTION

3. (U) Large subsurface casting pits have been used in the US for casting and curing large rocket motors. Motors of approximately 3 meters in diameter have been used as boosters for Titan space launch vehicles and will be used as boosters for the US space shuttle. Large subsurface casting pits improve the safety and handling conditions for casting and curing large-diameter motors.

4. (TSR) Solid propellant rocket motors [redacted] in diameter and larger have been seen at Biysk [redacted] Kamensk-Shakhtinskiy [redacted], and Pavlograd [redacted] Solid Motor Production Plants. These plants have finishing, handling, and transshipment facilities capable of processing and moving motors of at least [redacted] in diameter. 25X1 25X1 25X1

5. (TSR) Large rocket motors seen at Biysk Solid Motor Test Area II [redacted] were observed approximately one year after the completion of the large subsurface casting pits at Biysk plant II and the modifications to the large horizontal test cell at Biysk test area II.[1],[2] The presence of the large-diameter rocket motors clearly indicates that Biysk plant II is involved in their production and testing. Large motors have also been seen on railcars at the Kamensk-Shakhtinskiy and Pavlograd plants.[3] The construction of large-diameter casting pits at these two facilities is an indication that they will also play a significant part in the future production of large rocket motors. 25X1

BASIC DESCRIPTION

6. [redacted] Biysk, Kamensk-Shakhtinskiy, and Pavlograd Solid Motor Production Plants have played an important role in the Soviet solid propellant rocket motor industry. [redacted] 25X1 25X1 25X1

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7. (TSR) A large casting pit was observed under construction at Biysk plant II as early as August 1970. Construction was stopped on this pit shortly after it began and was not resumed until December 1973. By June 1975, the casting pit and its associated casting building had been completed. Construction of the second casting pit at Biysk was started in September 1975. This second casting pit and its associated casting building were complete in September 1976. Construction on the casting pits at Kamensk-Shakhtinskiy and Pavlograd began during the summer of 1978 and continued into 1979. The completion and operation of the four large casting pits will give the Soviets the capability to cast and cure rocket motors that are larger in diameter than those currently being produced. Table 1 shows the construction dates and dimensions of the large-diameter casting pits. Table 2 shows the dimensions of propellant production buildings known to be associated with these pits. A chronological description of the construction of the casting pits at the three facilities follows.

Biysk Solid Motor Production Plant II

8. (TSR) Two large-diameter subsurface casting pits have been constructed at Biysk plant II. Initial construction of the first casting pit was observed on [redacted] but no building footings were seen until [redacted] The casting pit (Figure 1) has an inner diameter of [redacted] and an outer diameter of [redacted] meters. A casting building [redacted] meters was constructed over the pit between February and June 1975. The building is rail served from the assembly line at Biysk plant II and the rail door opening is [redacted] A second casting pit (Figure 2) was observed under construction on [redacted] This pit has an inner diameter of [redacted] and an outer diameter of [redacted] A casting building [redacted] was constructed over the second casting pit between April and November 1976. This second building is also rail served, and the rail door opening is [redacted] A [redacted] bunkered control building is approximately midway between these two buildings (Figure 3). Interline distances between the first and second casting buildings and the bunker are [redacted] respectively. Lightning arresters have been constructed around both casting buildings. 25X1 25X1 25X1

9. (TSR) Although the casting pits and buildings were complete by September 1976, the propellant production line probably did not become operational until 1978 (Figure 3). The completion of the two casting pits and buildings coincided with the completion of modifications to the large horizontal test position at Biysk test area II.[2] The modifications were complete by November 1977. The first evidence of testing of large-diameter rocket motors was observed in June 1978 when a probable mockup of a large segmented motor was observed in the boneyard of the test area. Additional large-diameter motors were seen at Biysk test area II during 1979.[1]

Kamensk-Shakhtinskiy Solid Motor Production Plant

10. (TSR) Major modifications have been in progress at Kamensk-Shakhtinskiy since before April 1977.[4] By July 1978, a casting pit with an inner diameter of [redacted] and an outer diameter of [redacted] was observed in the new area of construction immediately north of the existing casting/curing area. The new casting pit was at least [redacted] higher than original ground level. The area around the pit was graded and leveled by [redacted] and footings were observed for a rectangular building to be constructed over the casting pit (Figure 4). By [redacted] (Figure 5), the rectangular building had been constructed. It is in two sections—one 30 meters long by 18 meters wide and [redacted] high and the other 18 meters wide by [redacted] long and 10 meters high. The casting pit is within the larger, higher 25X1 25X1 25X1 25X1 25X1 25X1 25X1 25X1 25X1 25X1 25X1

Table 1.
Construction Chronology and Dimensions of Large-Diameter Casting Pits

This table in its entirety is classified TOP SECRET RUFF

Location	Date First Observed Ucon	Date Prob Operational	Inner Diam (m)	Outer Diam (m)
Biysk				
Casting pit 1	[redacted]		[redacted]	
Casting pit 2				
Kamensk-Shakhtinskiy				
Pavlograd				

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Table 2.
Dimensions of Propellant Buildings Associated with Large-Diameter Casting Pits

This table in its entirety is classified TOP SECRET RUFF

Location	Casting Bldg (m)	Mix Bldg (m)	Control Bldg (m)	Unid Bldg (m)
Biysk	43 x 21 x [redacted]	—	38 x 19	—
	43 x 21 x	—	—	—
Kamensk-Shakhtinskiy	41 x 18 x [redacted]	19 x 14 x [redacted] (prob	36 x 17	—
Pavlograd	Ucon	18 x 13 x [redacted] (prob)	36 x 15	—
	—	—	40 x 14	25 x 12

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section. The rectangular casting building is rail served, and the rail door opening is [redacted] meters. A possible vacuum bell [redacted] long with an inner diameter of [redacted] an outer diameter of [redacted] and a flanged end [redacted] meters in diameter was observed lying on the ground in front of the casting building on [redacted]

11. (TSR) A probable mix building 19 by 14 by [redacted] is southwest of the casting building. This probable mix building is rail served and earth barricaded. A control building for the mix building is under the earth barricade and is 36 by 17 by 5 meters. Lightning arresters protect both the casting building and the probable mix building.

12. (TSR) Motors approximately [redacted] ters in diameter have been seen on railcars within the plant since November 1977. Three cylinders, each with an outer diameter of [redacted] meters and an inner diameter of [redacted] and [redacted] long, have been observed since July 1978 near the entrance to the plant.

13. (TSR) The presence of large cylinders, which were approximately [redacted] in diameter, and the construction of a large-diameter casting pit at this facility suggest that the Soviets will produce large-diameter rocket motors at Kamensk-Shakhtinskiy in the future.

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Pavlograd Solid Motor Production Plant

14. (TSR) A new area of construction was observed outside the east security wall of the plant on [redacted] By August 1978, a new casting pit had been identified under construction (Figure 6). It has an inner diameter of [redacted] an outer diameter of [redacted] and was [redacted] above original ground level. The area around this large casting pit was backfilled by [redacted] A probable mix building and a probable control building are west of the casting pit. The probable mix building is 18 by 13 by [redacted] Personnel and rail passageways are under construction near this building, suggesting that the building will be earth barricaded. The control building is 36 by 15 by 5 meters and is earth mounded.

15. (TSR) West of these buildings are a second probable control building and an unidentified building under construction (Figure 7). The second control building is 40 by 14 meters, and the unidentified building is 25 by 12 meters. This new area of construction will be road and rail served from the existing plant. 25X1 25X1 25X1

16. (TSR) Motors of approximately [redacted] meters in diameter have also been seen within the Pavlograd plant. When the new casting pit is completed, the production of even larger diameter motors can be expected. 25X1 25X1

REFERENCES

IMAGERY

(TSR) All available KEYHOLE imagery acquired through [redacted] was used in the preparation of this report. 25X1

MAPS OR CHARTS

ACIC. US Air Target Chart; Series 200; Sheets 0161-21, 0234-22, and 0234-24; scale 1:200,000 (UNCLASSIFIED)

DOCUMENTS

1. NPIC, [redacted] PIR-052/79, *Soviet Segmented Rocket Motor Testing at Biysk Solid Motor Test Area II, USSR (TSR)*, Jul 79 (TOP SECRET [redacted] 25X1 25X1
2. NPIC, [redacted] SR-091/77, *Modifications to the Horizontal Test Position, Biysk Solid Test Area II, USSR (TSR)*, Dec 77 (TOP SECRET [redacted] 25X1 25X1
3. NPIC, [redacted] RCA-09/0007/79, *Developments at Soviet Solid Propellant Production Facilities (TSR)*, Apr 79 (TOP SECRET [redacted] 25X1 25X1
4. NPIC, [redacted] RCA-09/0019/77, *Developments at Soviet Solid Propellant Production Facilities (TSR)*, May 78 (TOP SECRET [redacted] 25X1 25X1

REQUIREMENT

Project 130094NJ

(S) Comments and queries regarding this report are welcome. They may be directed to [redacted] Soviet Strategic Forces Division, Imagery Exploitation Group, NPIC, [redacted] 25X1 25X1

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